



IBM Information Management Software

DB2 Server for VSE & VM v7.5 New Features



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Agenda

- DB2 Client Edition on VSE and VM
- DB2 Server for VSE & VM Performance Improvements
 - Improvements in DB2 Code
 - FOR FETCH ONLY Cursors
- DB2 Server for VSE & VM Usability Improvements
 - EXPLAIN Option on DBSU REBIND PACKAGE Command
 - BIND File Support
- APARs
 - Multi Row Insert
 - Connection Pooling using DRDA over TCP/IP

Client Edition

- DB2 Client Edition is a separately installable FEATURE
- DB2 Client Edition for VM and VSE have the same licensing process as with the DB2 Server (Base product) but priced around existing PRPQ rates
- DB2 Client Edition can co-exist with other base product installation
- Default installation libraries/disks are different client edition feature and base product
- DB2 Client Edition reduces Total Cost of Ownership and around 50% to 60% percent of Base product code size
- DB2 Client Edition has all enhancements of 7.5 except Improved Checkpoint Performance which is a server feature

Client Edition

DB2VSE Envi- ronments	DB2/VSE Components ¹				Supported Languages			
	Batch RA	ORA	ISQL	PL/I	Cobol	Fortran	C	ASM
Batch	X			X	X	X	X	X
Online Query/ Report Writing		X	X	X	X		X	X
DRDA Requestor	X	X	X	X	X		X	X

Notes:

Batch RA refers to the Batch Resource Adapter of the DB2 Server for VSE, Client Edition support for batch environment.

ORA (online resource adapter) refers to the DB2 Server for VSE support for transaction processing (CICS*) environments.

ISQL refers to the terminal user query and report-writing facilities.

Prerequisite programs should be installed before you begin to do any of the steps described in this manual.

Client Edition

- DRDA is enabled by default in Client Edition
- Assembler TCP/IP interface is the default
- LE/C or EZASMI TCP/IP interfaces are enabled using Linkedit or manual VMFBLD steps
- There are very few System Administration differences between the client edition and the client portion of the base product
- A revision of program directories of the CE is planned soon based on some inputs and feedback from Beta Customers
- Program Directories are available on the Centra website

Performance Enhancement Features

1. Make on-line programs AMODE 31 RMODE ANY
2. Convert TCP/IP LE/C interface to EZASMI API
3. Reduced DRDA code path length
4. Improved Checkpoint Performance

Online Resource Adapter Above 16MB Line

- Currently DB2 online Resource Adapter phases are in 24 bit addressing mode and hence they reside below the 16MB line of the Virtual Storage occupying the premium space.
- Provides more flexible application programming environment for online users and also enables future enhancements to the Online Resource Adapter.

Convert TCP/IP LE/C interface to EZASMI API

- Currently DB2 uses LE/C interface for the Server TCP/IP functions and LE/C or CSI Assembler Interface for the client TCP/IP Functions.
- This line item will provide with an option of using EZASMI interface to improve the performance of Client / Server communications.
- This programming interface is provided for
 - Server Communications
 - Programming in a batch environment
 - Programming in a CICS Transaction Server environment.
- The Improved performance will be visible to DRDA users.

Additional resource required?

- EZASMI support on Batch and Server work with all supported versions of Z/VSE.
- Z/VSE 4.1 is required for Online EZASMI support.

Features & Benefits

- This is a new feature provided with the aim of improving performance in Client / Server interactions using TCP/IP requests over DRDA.
- The EZASMI interface is common for both BSI and IBM versions.
- The overhead of LE/C environment, associated with the LE/C interface, is eliminated, while using EZASMI and thus improving performance
- EZASMI implementation from IBM has LE/C dependency, on VSE versions prior to Z/VSE 3.1. From Z/VSE 3.1, as the LE/C dependency is removed, the overall performance of EZASMI will improve.
- This functionality, upgrades DB2 Server for VSE/VM to IBM's latest TCP/IP programming Interface.

DRDA Code Path Length Reduction

- Better buffering logic for Resource Adapter runtime data
- Enhanced DRDA message parsing logic that reduce CPU utilization through better process elimination techniques
- Increasing resident properties of frequently accessed routines

Usage

Performance improvement is evident while performing any of the following actions:

- Connect from remote connection
- Select from remote connection
- Update from remote connection
- Insert from remote connection
- Issue 'Rollback'
- Issue 'Commit'
- Connect in a loop
- Select in a loop
- Running a Batch application to gauge performance

Improved Checkpoint Performance

- Large databases can do thousands of I/Os for each checkpoint while users must wait for the checkpoint to complete. This change will block up to 256 I/O requests together into a single call to the Operating System. Thus reducing the I/O interrupt handling and I/O elapsed times.
- A System Checkpoint ensures the Database, the Directory and the Log are all in a consistent state, to which it can be recovered. This also frees up resources as no longer necessary duplicates of data are freed for reuse.

FOR FETCH ONLY

- This function is an extension to the cursor SELECT statement. When the user wants to have a read-only cursor they can use the FOR FETCH ONLY clause to always force the use of blocking for the cursor.
- DB2 Server for VSE&VM did not support this clause in the select statement in the earlier releases. This was inconvenient to the remote users of other systems because they cannot use this clause against DB2 VSE&VM application servers. In order to use blocking for a cursor, the user must preprocess their application explicitly with the BLOCK preprocessing option. However, this is not possible on other systems because the blocking option has not been externalized on their pre-compilers.

FOR FETCH ONLY

- This feature allows DB2 VSE & VM servers to utilize the SBLOCK option. With SBlock, the eligible cursors with FOR FETCH ONLY clause will be blocked. SBLOCK will be made as the new default blocking option (the current default blocking option is NOBLOCK) for the CREATE PACKAGE command and the SQLPREP EXEC.
- A synonym of the FOR FETCH ONLY clause is FOR READ ONLY.
- The rules that exist today for blocking will not change and will apply to this function. This function does NOT apply to an UPDATE or DELETE WHERE CURRENT OF statement. If the cursor is referenced in an UPDATE or DELETE statement, SQLCODE -510 will be issued.
- If the preprocessing option of NOBLOCK is used, then it will apply to all cursors in the package including those defined as FOR FETCH ONLY.

EXPLAIN Option on DBSU REBIND PACKAGE Command

- Retrieves information about the access path chosen for the execution of the SQL query in the package, and about the structure and execution performance of a DELETE, INSERT, UPDATE or SELECT statements.
- If EXPLAIN(YES) is issued, then all four update tables (STRUCTURE, PLAN, COST, REFERENCE) will be updated.
- If EXPLAIN(NO) is issued, then none of the four update tables will be updated.
- If SERVAIDS 9 is turned on at the server along with EXPLAIN (YES), then predicate table will also be updated.

EXPLAIN Option on DBSU REBIND PACKAGE Command

The REBIND PACKAGE syntax will be as follows:

```

                                     +--EXPLAIN(NO)---+
                                     |                               |
>>-REBIND PACKAGE-(package-name)-+-----+-----+--><
                                     |                               |
                                     +--EXPLAIN(YES)---+

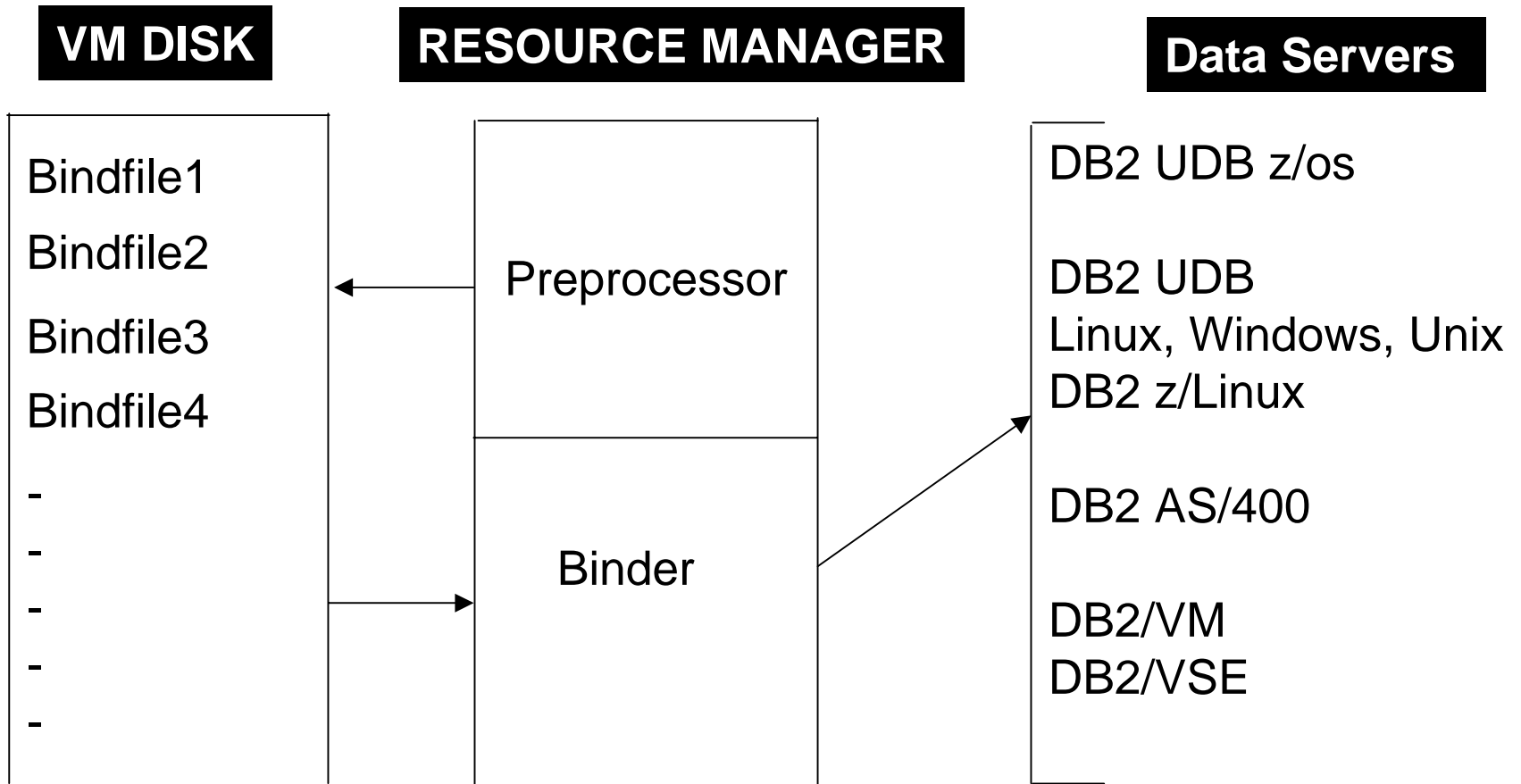
```

NOTE: - The default is EXPLAIN(NO) if no parameter is specified.

Example:

```
REBIND PACKAGE(SMITH.PROG) EXPLAIN(YES)
```

Figure: VM Binding



New Preprocessor Parameter (for VM only)

BIND/NOBIND

- Parameter decides whether a bind file is to be created during preprocessing.
- NOBIND is the default.

PACKAGE/NOPACKAGE

- Parameter decides whether a package is to be created during preprocessing.
- PACKAGE is the default.

New Preprocessor Parameter (for VM only)

- If only bind file creation is required, specify BIND, NOPACKAGE.
- BIND and NOPACKAGE combination allows creation of a bind file for the application without an active database server.
- **SYSBIND (BI)**
 - `sysBInd(filename filemode filetype)`
 - filemode defaults to SQLBIND
 - filetype defaults to BINDFILE
 - filemode defaults to A

BIND Output

Binder (SQLBIND) displays output of the Binding on the terminal. It also creates two output files with filetype BINDLST and BINDOUT. Name of these output files is same as that of bind file and filemode A.

Fn (same as Bindfile)	BINDOUT	A
-----------------------	---------	---

Fn (same as Bindfile)	BINDLST	A
-----------------------	---------	---

On successful completion, package is created in target databases.

Preprocessing and Bind File in VSE environment

- VSE preprocessor must be invoked with BIND prep option to create the Bindfile.
- Label names must be SQLBIND and BINDWKF for Bindfile and Bindwork file respectively during preprocessing step.
- Batch Binder can be used to bind the bind file created in preprocessing step to bind with target database server.

VSE Online Binder Invocation

- Online Binder can be invoked by running CICS transaction
- CBND in similar fashion as it was done in past releases.
- Same Bindfile can be used for batch and online binders.

Multi Row Insert

- Currently there is no blocking available on normal INSERTs and PUT requests using DRDA for the DB2 Server for VSE& VM AR.
- Users will be given the option of blocking their PUTs using the already existing BLOCK preprocess parameter and the option of blocking their normal INSERTs using a new IBLOCK preprocessor parameter.
- This feature will also allow DBSU DATALOAD to block inserts as a side effect. This will be because the DATALOAD utility uses SQL PUT function internally.
- The size of the Buffer that will be used to Block inserts will depend on the QRYBLKSIZE parameter in the SQLINIT for VM and SQLGLOB in VSE.
- Application programs need to be tailored such that, all homogenous insert statements are executed immediately one after the other, to exploit the advantages of blocking.

Multi Row Insert

Homogenous insert statements are defined as a set of insert statements are:

- a) Access the same DB2 table.
- b) Access the same set of columns in that table, in the same order.

There must be an 'SQL COMMIT' statement after a set of homogenous insert statements. This causes the buffer to be sent, processed by the DB2 UDB Server and response received and parsed by the Application requester. This means that there should not be any other SQL statement (s), between 2 insert statements that needs to be blocked.

The following are the scenarios in which the buffer is sent to the UDB server:

- a) 'SQL COMMIT' statement is encountered after a set of homogenous insert statements.
- b) The buffer is full with a set of homogenous insert statements.
- c) A non-insert statement is encountered after a set of homogenous SQL statements.

Limitations

- There should not be any other SQL statement (s), between two insert statements that need to be blocked.
- This feature will NOT work for EXECUTE IMMEDIATE insert statements.
- DATALOAD specified with COMMITCOUNT (n) option where 'n' is a positive integer, will block only those 'n' insert statements before each commit.
- Recommend not use SQLERRD(3) to count the number of inserted rows as this may have an incorrect value.

Implementation

- Apars PK32795 and PK48616(Doc Apar)
- Affects DB2 VM and DB2 for VSE Batch Application Requestors

DRDA Connection Pooling Functional Overview

- **Stage 1:** CIRB/CIRA creates a pool of TCP/IP links or sockets based on the number of links positional parameter
 - Example : CIRB ,10,,,,RMTSRVR
 - Example : CIRA ,10,,RMTSRVR
 - In both examples 10 connections are created and stored in the pool

- **Stage 2:** Online applications when issuing implicit or explicit SQL CONNECT, will be queued for a TCP/IP link to be allocated from the pool

Functional Overview

- **Stage 2 (contd.):** Connections are released by the online applications after use on the following conditions
 - COMMIT RELEASE (Not just COMMIT)
 - ROLLBACK RELEASE (Not just ROLLBACK)
 - Database switching
 - End of transaction
 - Another CONNECT
- Environment where Online Applications that stay CONNECTed for long time should have more Connections in the Connection pool or these applications will go on a long wait often as existing applications do not relinquish connections and stay connected
- **Stage 3:** Connection Pool is destroyed on CIRR/CIRT when removing the Remote server.

Life Cycle of a Connection in the Connection Pool

- Typically all connections in the connection pool are created at the time of CIRB/CIRA
- Typically all connections in the connection pool are destroyed at the time of CIRR/CIRT
- If a connection/link that was allocated for an online application is bad a **-933** is thrown to the user and an attempt is made to reestablish the link so next time around the link might be good
- Connections could go bad if the remote server forcefully/closes the connection at its end due to error conditions.
- Some servers like DB2 LUW closes the connection if no SQL message arrives within a stipulated time limit controlled by DB2_SERVER_CONNTIMEOUT
- Highly recommended to disable this timeout function in DB2 LUW if using Connection pooling otherwise **bad link (-933)** condition might occur very often

Limitations/Known problems

- Connections are not released at the end of COMMIT/ROLLBACK but only released after COMMIT RELEASE or ROLLBACK release
- Spurious behavior of Online Resource adapter has been found with extensive database switching scenarios. But this has not been limited to the Connection Pooling feature, but reported after applying the APAR. Working on solutions.
- Fixes for the following problems are available
 - Implicit Connect throwing -934
 - CIRB does not work for second time and needs CICS to be recycled if the server was down and first attempt failed
 - Force Connection at the server

Implementation

- Apars PK25367 and PK44744 (doc APAR)
- Affects only DB2 Online Components on CICS on VSE
- Optionally enabled based on a DBNAME parameter CONNPOOL
- By default it is **enabled**.



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References

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